

AGREEMENT

BETWEEN

THE DEPARTMENT OF DEFENSE  
OF THE UNITED STATES OF AMERICA

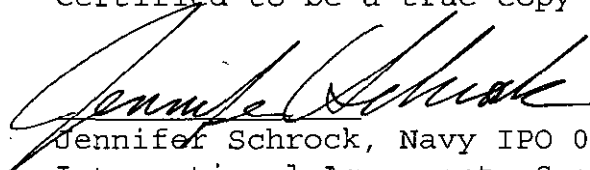
AND

THE MINISTRY OF DEFENSE  
OF THE REPUBLIC OF ITALY

FOR THE

SIX DEGREE OF FREEDOM REYNOLDS AVERAGED NAVIER STOKES PROJECT  
(SHORT TITLE: 6DOF RANS PROJECT)

Certified to be a true copy



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## TABLE OF CONTENTS

PREAMBLE.....	3
ARTICLE I	
DEFINITIONS.....	4
ARTICLE II	
OBJECTIVE(S).....	7
ARTICLE III	
SCOPE OF WORK.....	8
ARTICLE IV	
MANAGEMENT (ORGANIZATION AND RESPONSIBILITY).....	11
ARTICLE V	
FINANCIAL PROVISIONS.....	14
ARTICLE VI	
CONTRACTING PROVISIONS.....	16
ARTICLE VII	
PROJECT EQUIPMENT.....	18
ARTICLE VIII	
DISCLOSURE AND USE OF PROJECT INFORMATION.....	20
ARTICLE IX	
CONTROLLED UNCLASSIFIED INFORMATION.....	25
ARTICLE X	
VISITS TO ESTABLISHMENTS.....	27
ARTICLE XI	
SECURITY.....	28
ARTICLE XII	
THIRD PARTY SALES AND TRANSFERS.....	29
ARTICLE XIII	
LIABILITY AND CLAIMS.....	31
ARTICLE XIV	
PARTICIPATION OF ADDITIONAL PARTIES.....	32
ARTICLE XV	
CUSTOMS DUTIES, TAXES, AND SIMILAR CHARGES.....	33
ARTICLE XVI	
SETTLEMENT OF DISPUTES.....	34
ARTICLE XVII	
LANGUAGE.....	35
ARTICLE XVIII	
AMENDMENT, TERMINATION, ENTRY INTO FORCE, AND DURATION..	36

## PREAMBLE

The Department of Defense of the United States of America (DOD) and the Ministry of Defense of the Republic of Italy (MOD), hereinafter referred to as the "Parties":

Having a common interest in defense;

Recognizing the benefits to be obtained from standardization, rationalization, and interoperability of military equipments;

Desiring to improve their mutual conventional defense capabilities through the application of emerging technology;

Having a mutual need for analytic capabilities for predicting the viscous effects of roll motion on surface ships and submarines operating on the surface of a seaway in order to satisfy common operational requirements; and

Having independently conducted studies, research, exploratory development, and testing of the applications of various technologies, recognize the benefits of cooperation in the Six Degree of Freedom Reynolds Averaged Navier Stokes (6DOF RANS) Project;

Have agreed as follows:

## ARTICLE I

### DEFINITIONS

The Parties have agreed upon the following definitions for terms used in this Agreement:

Classified Information	Official information that requires protection in the interests of national security and is so designated by the application of a security classification marking. This information may be in oral, visual, magnetic or documentary form or in the form of equipment or technology.
Contract	Any mutually binding legal relationship under national laws which obligates a Contractor to furnish supplies or services, and obligates one or both of the Parties to pay for them.
Contracting	The obtaining of supplies or services by Contract from sources outside the government organizations of the Parties. Contracting includes description (but not determination) of supplies and services required, solicitation and selection of sources, preparation and award of Contracts, and all phases of Contract administration.
Contracting Agency	The entity within the government organization of a Party, which has authority to enter into, administer, or terminate Contracts.
Contracting Officer	A person representing a Contracting Agency of a Party who has the authority to enter into, administer, or terminate Contracts.
Contractor	Any entity awarded a Contract by a Party's Contracting Agency.

Controlled Unclassified Information	Unclassified information to which access or distribution limitations have been applied in accordance with applicable national laws or regulations. Whether the information is provided or generated under this Agreement, the information shall be marked to identify its "in confidence" nature. It could include information, which has been declassified, but remains controlled.
Defense Purposes	Manufacture or other use in any part of the world by or for the armed forces of either Party.
Foreground Information	Information generated in the performance of the Project.
Non-financial Costs	Project costs met with non-monetary contributions
Patent	Legal protection of the right to exclude others from making, using, or selling an invention. The term refers to any and all Patents including, but not limited to, Patents of implementation, improvement or addition, petty Patents, utility models, appearance design Patents, registered designs, and inventor certificates or like statutory protection as well as divisions, reissues, continuations, renewals, and extensions of any of these.
Project	The cooperative project, covered by this Agreement, to develop, verify and validate computational methods, utilizing Reynolds Averaged Navier Stokes (RANS) equations, to account for viscous effects in the prediction of the six degree of freedom motions (i.e., surge, sway, heave, roll, pitch and yaw) for surface ships and submarines operating on the surface of a seaway.
Project Background Information	Information not generated in the performance of the Project.

Project Equipment	Any material, equipment, end item, subsystem, component, special tooling or test equipment jointly acquired or provided for use in the Project.
Project Information	Any information provided to, generated in, or used in this Project regardless of form or type, including, but not limited to, that of a scientific, technical, business, or financial nature, and also including photographs, reports, manuals, threat data, experimental data, test data, designs, specifications, processes, techniques, inventions, drawings, technical writings, sound recordings, pictorial representations, and other graphical presentations, whether in magnetic tape, computer memory, or any other form and whether or not subject to copyright, patent, or other legal protection.
Project Invention	Any invention or discovery formulated or (conceived or "first actually reduced to practice") in the course of work performed under a Project. The term first actually reduced to practice means the first demonstration, sufficient to establish to one skilled in the art to which the invention pertains, of the operability of an invention for its intended purpose and in its intended environment.
Project Plan	A plan approved by the Steering Committee that provides a description of the Project's Phase 1 and Phase 2 delivery requirements and milestones.
Third Party	A government other than the government of a Party and any person or other entity whose government is not the government of a Party.

## ARTICLE II

### OBJECTIVE(S)

2.1. The objectives of this Project are:

- 2.1.1. To improve the ability to predict the six degree of freedom (6DOF) motions for surface ships and submarines operating on the surface of a seaway.
- 2.1.2. To enable the Parties to make national decisions concerning use of computational methods at naval-design facilities and other support locations.

## ARTICLE III

### SCOPE OF WORK

3.1. The overall work to be performed under this Agreement shall be performed in two (2) phases and includes:

- 3.1.1. Development of 6DOF Reynolds Averaged Navier Stokes (RANS) computational methods to predict the 6DOF motions for surface ships and submarines operating on the surface of a seaway.
- 3.1.2. Verification and testing of 6DOF RANS computational methods to predict the 6DOF motions for surface ships and submarines operating on the surface of a seaway.
- 3.1.3. Validation of 6DOF RANS computational methods to predict the 6DOF motions for surface ships and submarines operating on the surface of a seaway.

3.2. The Project, which shall be performed in two (2) phases, shall include, but not be limited to, the following specific tasks which shall be conducted jointly and lead by the Party in parentheses following each task, respectively:

#### PHASE 1

- 3.2.1. Development of 6DOF RANS computational methods, by extending the currently available Unsteady Reynold-Averaged Navier Stokes Equations (URANSE) to include modeling and numerical methods for six (6) degree of freedom simulations. (DOD)
- 3.2.2. Verification, by modeling and simulating against select test data, that the 6DOF RANS computational methods can be properly used. (MOD)
- 3.2.3. Validation of 6DOF RANS computational methods through comparisons with model test data. (DOD)
- 3.2.4. Development of advanced towing tank measurement systems. (DOD)
- 3.2.5. Performance of model tests on select hull forms and two-dimensional cross sections. (MOD)



- 3.2.6. Completion of final reports and documentation concerning the 6DOF RANS computational methods. (DOD)

PHASE 2

- 3.2.7. Performance of full scale trials of bilge keel and propulsor forces. (DOD and MOD)

- 3.2.7.1. Provision of select ship for performance of full scale trial measurements. (Provision by MOD)

- 3.2.7.2. Development of a data acquisition system for measuring full scale propulsor forces. (Provision by DOD)

- 3.2.7.3. Securing of instrumentation to support full scale trial measurements, to include installation of necessary cables and performance of pre- and post-trial calibration of system hardware gages during drydockings. (Provision by MOD)

- 3.2.7.4. Removal of all system hardware, gages and associated equipment from ship used for full scale trials. (Provision by MOD)

- 3.2.7.5. Provision of technical support for the full scale trials. (Provision by DOD)

- 3.2.8. Validation of 6DOF RANS computational methods, through comparisons with model and full scale test data. (DOD)

- 3.2.9. Analysis of results of model tests and full scale propulsor measurements. (DOD)

- 3.2.10. Completion of final reports and documentation concerning the 6DOF RANS computational methods. (DOD)

3.3. A more detailed description of phase 1 and phase 2 of the Project shall be included in the Project Plan prepared in accordance with the provisions of Article IV (Management (Organization and Responsibility)).

3.4. Phase 1 shall cover a period of approximately three (3) years. Phase 2 activities shall last approximately two (2) years.

3.5. Upon entry into effect of this Agreement, the Parties shall perform the phase 1 activities of the Project.

3.6. Participation in phase 1 of the Project does not imply that the Parties shall enter into phase 2. Before the end of phase 1 the Steering Committee (SC) shall consult and decide, in accordance with Article IV (Management (Organization and Responsibility)), whether to enter into phase 2 of the Project.

## ARTICLE IV

### MANAGEMENT (ORGANIZATION AND RESPONSIBILITY)

4.1. This Project shall be directed and administered on behalf of the Parties by an organization consisting of a Steering Committee (SC) and Project Managers (PMs) appointed by the Parties. The SC shall have overall authority over the PMs, in accordance with this Agreement. The PMs shall have primary responsibility for effective implementation, efficient management, and direction of the Project in accordance with this Agreement. The Parties shall maintain and fund their own organizations for managing this Project.

4.2. The SC shall consist of a representative appointed by each Party. The SC shall meet at the request of either representative. Each meeting of the SC shall be chaired by the representative of the Party hosting the meeting. Decisions of the SC shall be made unanimously. In the event that the SC is unable to reach a timely decision on an issue, each SC representative shall refer the issue to its higher authority for resolution. In the meantime, the approved Project Plan shall continue to be implemented without interruption under the direction of the PMs while the issue is being resolved by higher authority.

4.3. The SC shall be responsible for:

- 4.3.1. Exercising executive-level oversight of the Project.
- 4.3.2. Approving the Project Plan and any revisions thereto.
- 4.3.3. Reviewing the technical progress of the Project against the approved Project Plan.
- 4.3.4. Reviewing the financial status of the Project to ensure compliance with the provisions of Article V (Financial Provisions) of this Agreement.
- 4.3.5. Resolving issues brought forth by the PMs.
- 4.3.6. Reviewing and forwarding to the Parties for approval recommended amendments to this Agreement

in accordance with Article XIX (Amendment, Termination, Entry Into Force, and Duration).

- 4.3.7. Approving plans to manage and control the transfer of Project Equipment provided by either Party to support the execution of the Project in accordance with Article VII (Project Equipment).
- 4.3.8. Providing recommendations to the Parties for the addition of new Parties in accordance with Article XIV (Participation of Additional Parties).
- 4.3.9. Monitoring Third Party sales and transfers authorized in accordance with Article XII (Third Party Sales and Transfers).
- 4.3.10. Reviewing the annual status report submitted by the PMs.
- 4.3.11. Before the end of phase 1, evaluating the performance and results of phase 1 and deciding in writing whether to proceed to phase 2 of the Project.

4.4. Project offices shall be established in Carderock, Maryland and in Rome, Ministry of Defense/Navy to manage the Project. The U.S. Department of the Navy shall appoint the U.S. PM, and the Ministry of Defense of the Republic of Italy shall appoint the Italian PM, both of whom shall be responsible for implementing this Agreement and for carrying out the Project.

4.5. The PMs are completely and wholly responsible for management of those tasks listed in Article III (Scope of Work) of this Agreement.

4.6. For matters under their cognizance the PMs shall be responsible for:

- 4.6.1. Managing and monitoring the cost, expenditures, schedule, performance requirements, technical, security and financial aspects of the Project.
- 4.6.2. Preparing and submitting a Project Plan to the SC representative for approval.
- 4.6.3. Executing the approved Project Plan.

- 4.6.4. Developing and submitting any required changes to the approved Project Plan to the SC for approval.
- 4.6.5. Executing the financial aspects of the Project in accordance with Article V (Financial Provisions) of this Agreement.
- 4.6.6. Referring issues to the SC that cannot be resolved by the PMs.
- 4.6.7. Developing and recommending amendments to this Agreement to the SC.
- 4.6.8. Developing and implementing SC-approved plans to manage and control the transfer of Project Equipment provided by either Party in accordance with Article VII (Project Equipment).
- 4.6.9. Forwarding recommendations to the SC for the addition of new Parties in accordance with Article XIV (Participation of Additional Parties).
- 4.6.10. Providing an annual status report to the SC, and other such reports as directed by the SC.